11 Case Studies

Because there are complex permitting issues associated with 40 CFR 430, this section presents case studies showing the development of NPDES permits for mills subject to BPT and BAT under Subparts B and E. There are nine case studies, which cover a variety of mill types and complexity. Each case study presents the following:

- Example mill's current permit status;
- General site description;
- Information about mill operations relevant to establishing permit limits;
- Step-by-step approach to determining limits for each regulation (e.g., BPT, BAT); and
- Final limits as they would appear in each example mill's permit.

Table 11-1 summarizes the nine case studies to assist you in selecting the one(s) of most interest to you.

Table 11-1: Summary of Case Studies

Case Study #	Description of Mill	Discharge Status (Direct or Indirect)	Subpart(s) Covering Operations	Is Mill Enrolling in VATIP?
1	Bleached kraft mill with multiple products	D	Subpart B	
2	Papergrade sulfite mill with multiple products	D	Subpart E	
3	Colocated bleached papergrade kraft and papergrade sulfite mills with multiple products	D	Subparts B and E	
4	Colocated bleached papergrade kraft, thermomechanical, and secondary deink fiber mills with multiple products	D	Subparts B, G, and I	
5	Bleached papergrade kraft mill with multiple products and seasonal discharge	D	Subpart B	
6	Bleached papergrade kraft mill with multiple products and one existing fiber line and one new fiber line	D	Subpart B	
7	Bleached papergrade kraft mill that discharges to a POTW	I	Subpart B	
8	Bleached papergrade kraft mill with multiple products and one existing fiber line and one new fiber line enrolling in VATIP	D	Subpart B	X
9	Bleached papergrade kraft mill with purchased pulp in addition to an existing fiberline	D	Subpart B	

Case Study #1

The Softwood Paper Corporation manufactures fine paper and market pulp. The mill, which discharges effluent into the Seneca River, has submitted an application for a new NPDES permit because their current permit expires September 16, 1999.

Case Study #1 highlights:

1. Permit process for direct discharging mill with operations in Subpart B.
2. Production rate determination.

General Site Description

The Softwood Paper Corporation operates one bleached kraft fiber line and two paper machines, one to produce fine paper and another to produce market pulp.

Relevant Information for Establishing Permit Limits

The table below summarizes the information from the permit application you need to calculate discharge limits for the reissued NPDES permit.

Information Needed to Establish Permit Limits for Case Study #1	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subpart B
The mill is subject to which ELG&S?	BPT (40 CFR 430.22) Fine Paper Segment Market Bleached Kraft Pulp Segment BAT (40 CFR 430.24)
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use chlorophenolic biocides?	No

Softwood Paper manufactures bleach kraft pulp and two products (fine paper and bleached kraft market pulp). The two products fall under two segments of Subpart B. Because BPT ELGs for conventional pollutants and BAT for AOX and chloroform are mass-based, you must review the production information submitted with the mill's permit application to determine production rates for each product and for bleached pulp to calculate their BPT and BAT limits. The table below explains how to calculate production rates (also see Section 8 for a description of how to determine production rates).

CASE STUDY #1

In reviewing the monthly production data for Softwood paper from the last five years, you find that the maximum production occurred from August 1996 - July 1997. The monthly production data from this time period will determine the production rate that results in the maximum permit limits for conventional pollutants, AOX, and chloroform.

Date	Bleached Kraft Pulp Production (ADMT/mo)	Fine Paper Segment Production Rate (OMMT/mo)	Market Pulp Production Rate (ADMT/mo)
August 1996	30,600	19,000	14,100
September 1996	30,650	19,250	14,200
October 1996	30,400	19,300	14,500
November 1996	30,800	19,500	14,650
December 1996	30,900	19,600	14,750
January 1997	30,300	19,200	14,600
February 1997	30,700	19,000	14,500
March 1997	30,400	18,900	14,500
April 1997	30,750	19,000	14,700
May 1997	30,500	19,100	14,800
June 1997	30,600	19,525	14,900
July 1997	30,900	19,625	4,800
Production Total (ADMT or OMMT/yr)	**376,500**	**231,000**	**175,000**
Total Op. Days/yr	**350**	**350**	**350**
Total (ADMT or OMMT/day)	**1,050**	**660**	**500**

Determining Permit Limits for Pollutants Regulated Under BPT

You may then calculate conventional pollutant permit limits using the following equation:

$$\text{Final Effluent Limit} = \sum (PROD_i \times Limit_i)$$

where:

$PROD_i$	=	Production rate
$LIMIT_i$	=	ELG for conventional pollutant
i	=	Segment

$$\text{Final Effluent Limit} = (\text{PROD}_{\text{fine paper}} \times \text{LIMIT}_{\text{fine paper}}) + (\text{PROD}_{\text{market pulp}} \times \text{LIMIT}_{\text{market pulp}})$$

The table below presents the conventional pollutant permit limits calculated for this mill.

BPT Segment	Production	TSS				BOD_5			
		Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
		ELG	Subtotal	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
Fine Paper	660 kkg/day	22.15 kg/kkg	14,600 kg/day	11.9 kg/kkg	7,850 kg/day	10.6 kg/kkg	7,000 kg/day	5.5 kg/kkg	3,600 kg/day
Market Pulp	500 kkg/day	30.4 kg/kkg	15,200 kg/day	16.4 kg/kkg	8,200 kg/day	15.45 kg/kkg	7,730 kg/kkg	8.05 kg/kkg	4,030 kg/day
BPT Final Effluent Limit Totals		29,800 kg/day		16,050 kg/day		14,730 kg/day		7,630 kg/day	

Determining Permit Limits for Pollutants Regulated Under BAT

The bleaching operations at Softwood Paper are covered under Subpart B. BAT ELGs for the regulated toxic and nonconventional pollutants are either concentration-based or mass-based. For concentration-based ELGs, you may simply include the limit specified in 40 CFR 430.24 for each pollutant as the permit limit.

Example: Concentration-Based Limit Calculation

TCDF: Maximum for one day = 31.9 pg/L
TCDD: <ML; Method 1613 ML for TCDD = 10 pg/L, TCDD maximum for one day = <10 pg/L

Example: Mass-Based Limit Calculation

For mass-based ELGs, such as those for chloroform and AOX, you must calculate the production rate of unbleached pulp entering the bleach plant. Using the maximum production time period illustrated above, the following table explains how to calculate the production rate for these pollutants (also see Section 8 for a description of how to determine production rate).

CASE STUDY #1

In your review of the permit application, you determine that the following production rate results in maximum AOX and chloroform permit limits.

Date	Bleached Kraft Pulp Production (ADMT)
August 1996	30,600
September 1996	30,650
October 1996	30,400
November 1996	30,800
December 1996	30,900
January 1997	30,300
February 1997	30,700
March 1997	30,400
April 1997	30,750
May 1997	30,500
June 1997	30,600
July 1997	30,900
Production Subtotal (ADMT/yr)	**376,500**
Total Op. Days/Year	**350**
Production Subtotal (ADMT/yr)	**1,050**

Softwood Paper used an 8% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. As a result, you can calculate the production rate for determining AOX and chloroform permit limits as follows:

1050/(1-0.08) = 1,141 ADMT/day of unbleached papergrade kraft pulp entering the bleach plant.

You may then determine permit limits for AOX and chloroform using the following equation:

Bleach plant or final effluent limit = PROD × LIMIT

where:

PROD = Production rate for AOX and chloroform (MT/day = kkg/day)
LIMIT = ELG for AOX or chloroform

> **Alert!** Remember, the mill must demonstrate compliance with chloroform limits at bleach plant effluent but with AOX limits at the final effluent.

The table below presents the limits calculated for AOX and chloroform.

Mill	Production	Chloroform				AOX			
		Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
		ELG	Total	ELG	Total	ELG	Total	ELG	Total
Softwood paper	1,141 kkg/day	6.92 g/kkg	7.90 kg/day	4.14 g/kkg	4.72 kg/day	0.951 kg/kkg	1,085 kg/day	0.623 kg/kkg	711 kg/day

Final Permit Limits for Softwood Paper

Table 11-2 presents the permit limits for Softwood Paper Corporation's NPDES permit.

Under the Clean Water Act, the NPDES permit must require immediate compliance with the new limitations. The permit will be issued in September 1999 (which is over a year after the promulgation of the final rule), and you are requiring Softwood Paper to meet permit limits immediately upon the reissuance of the permit. As shown in Table 11-2, using BPJ, you have included in the permit:

1. COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and
3. Mandatory flow measurement and recording of bleach plant and final effluent.

Make sure you also include the following in the permit:

- A reopener clause so that you may include COD permit limits when EPA promulgates ELGs for this pollutant (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-2: NPDES Permit Limits, Softwood Paper Corporation

Pollutant	Permit Limits		Effluent Monitoring Location	Sample Frequency	Sample Collection Method
	1-Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
TCDF	31.9 pg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Chloroform	7.90 kg/day	4.72 kg/day	Bleach Plant Effluent**	Weekly	24 hr composite
Trichlorosyringol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Pentachlorophenol	<5.0 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
AOX	1,085 kg/day	711 kg/day	Final Effluent	Daily	24 hr composite
COD*	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	14,730 kg/day	7,630 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	29,800 kg/day	16,050 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	Bleach Plant Effluent	Continuous	Recorder
Flow*	Report	Report	Final Effluent	Continuous	Recorder

*Reporting for COD and flow determined using Best Professional Judgment (BPJ).

**Acid and alkaline streams monitored separately.

Case Study #2

The White Bright Paper Company manufactures fine paper. Wastewaters produced during mill operations are treated using primary and secondary treatment prior to discharge into the Falls River. The mill has submitted a permit application to you because their NPDES permit expired January 1, 1998.

Case Study #2 highlights:

1. Permit process for direct dischargers with operations in Subpart E.
2. Production rate determination.

General Site Description

The White Bright Paper Company operates a papergrade sulfite process to produce pulp which it bleaches, and then uses it to make fine paper. The sulfite process uses a continuous digester and is ammonium-based. Prior to bleaching, the pulp is washed using vacuum washers.

Relevant Information for Establishing Permit Limits

The table below summarizes the information from the permit application you need to calculate discharge limits for the reissued NPDES permit.

Information Needed to Establish Permit Limits for Case Study #2	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subpart E
The mill is subject to which ELG&S?	BPT (40 CFR 430.52) Papergrade Sulfite with Continuous Digester Segment BAT (40 CFR 430.54) Ammonium-based Segment
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use chlorophenolic biocides?	No

Determining Permit Limits for Pollutants Regulated Under BPT

White Bright uses a vacuum washer and continuous digester and, therefore, the mill is subject to the segment of Subpart E that covers these operations. Because the BPT ELGs for conventional pollutants are mass-based, you must review their permit application to determine a production rate to calculate their BPT limits. The table below explains how to calculate production rate.

CASE STUDY # 2

In reviewing the monthly production data for White Bright Paper Company from the last five years, you find that the maximum 12-month production occurred from August 1996 - July 1997. The monthly production data from this time period will determine the production rate that results in the maximum permit limits for conventional pollutants.

Date	Fine Paper Production (OMMT)
August 1996	23,000
September 1996	22,500
October 1996	22,700
November 1996	22,100
December 1996	22,300
January 1997	22,100
February 1997	22,500
March 1997	22,300
April 1997	22,600
May 1997	22,950
June 1997	23,000
July 1997	21,910
Production Total (OMMT/year)	**269,960**
Total Op. Days/Year	**340**
Production Total (OMMT/day)	**794**

You may then calculate conventional pollutant permit limits using the following equation:

$$\text{Final Effluent Limit} = \sum (PROD_i \times Limit_i)$$

where:

$PROD_i$	=	Production rate
$LIMIT_i$	=	ELG for conventional pollutant
i	=	Subpart E Segment - Facilities with vacuum washers and continuous digesters

$$\text{Final Effluent Limit} = (\text{PROD}_{\text{Subpart E Segment - Facilities with vacuum washers and continuous digesters}}) \times (\text{LIMIT}_{\text{Subpart E Segment - Facilities with vacuum washers and continuous digesters}})$$

The table below presents the conventional pollutant permit limits calculated for this mill.

BPT Segment	Production	TSS				BOD_5			
		Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
		ELG	Subtotal	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
Papergrade Sulfite with Vacuum Washer and Continuous Digester	794 kkg/day	53.75 kg/kkg	42,700 kg/day	28.95 kg/kkg	23,000 kg/day	38,15 kg/kkg	30,300 kg/day	19.85 kg/kkg	15,800 kg/day

Determining Permit Limits for Pollutants Regulated Under BAT

Since all BAT ELGs for Subpart E are concentration-based, you must simply include the limit specified in the regulation for each pollutant as the permit limit.

Example: Concentration-Based Limit Calculation

TCDD: Maximum for one day = <ML; Method 1613 ML for TCDD = 10 pg/L,
TCDD: Maximum for one day = <10 pg/L

Final Permit Limits for White Bright Paper Company

Under the Clean Water Act, the NPDES permit must require immediate compliance with the new limitations. The permit will be issued in September 1999 (which is over a year after the promulgation of the final rule), and you are requiring White Bright Paper Company to meet permit limits immediately upon the reissuance of the permit. As shown in Table 11-3, you exercised BPJ to include the following in the permit:

1. Chloroform, AOX, and COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and
3. Mandatory flow measurement and recording of bleach plant and final effluent.

Make sure you also include the following in the permit:

- Because chloroform, AOX, and COD limits are reserved, a reopener clause so that you may include chloroform, AOX, and COD permit limits when EPA promulgates ELGs for these pollutants (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-3: Permit Limits for White Bright Paper Company

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1-Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
TCDF	<10 pg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Chloroform*	Report	--	Bleach Plant Effluent**	Monthly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
AOX*	Report	--	Final Effluent	Monthly	24 hr composite
COD*	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	30,300 kg/day	15,800 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	42,700 kg/day	23,000 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	Bleach Plant Effluent	Continuous	Recorder
Flow*	Report	Report	Final Effluent	Continuous	Recorder

"--" Monthly averages do not apply for pollutant.

*Reporting for chloroform, AOX, COD, and flow determined using BPJ.

**Acid and alkaline streams monitored separately.

Case Study #3

Acme Paper Company manufactures office paper, tissue, and clay-coated printing papers. The company operates both a bleached kraft fiber line and a papergrade sulfite fiber line. All process wastewater generated by Acme Paper is treated using primary and secondary treatment prior to discharge into the Tyler River. The mill has submitted a permit application because their current NPDES permit expires in August 2000.

Case Study #3 highlights:

1. Permit process for mill with operations in multiple subparts (Subparts B and E).
2. Production rate determination.

General Site Description

Acme Paper operates a bleached kraft fiber line producing bleached pulp that is used to manufacture fine papers and tissue. The papergrade sulfite fiber line bleaches pulp that is primarily used to manufacture printing paper and some of the bleached papergrade sulfite pulp is used to manufacture tissue. The tissue product is made up of both bleached kraft pulp and bleached sulfite pulp. The sulfite process is ammonium-based and the papergrade sulfite fiber line uses a pressure drum washing system prior to bleaching the pulp.

Relevant Information for Establishing Permit Limits

The mill has certified in their permit application that they use TCF bleaching to produce papergrade sulfite pulp. The table below summarizes relevant information for establishing permit limits for pollutants with ELGs.

Information Needed to Establish Permit Limits for Case Study #3	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subparts B and E
The mill is subject to which ELG&S?	<u>Subpart B</u> BPT (40 CFR 430.22) Fine Paper Segment Paperboard, Coarse Paper, and Tissue Segment BAT (40 CFR 430.24) <u>Subpart E</u> BPT (40 CFR 430.52) Papergrade Sulfite with Vacuum or Pressure Drum (bisulfite liquor/surface condenser) Segment BAT (40 CFR 430.54) Ammonium-Based Segment

Information Needed to Establish Permit Limits for Case Study #3	
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	Only on the papergrade sulfite line.
Does the mill use chlorophenolic biocides?	No

Acme Paper Company manufactures papergrade kraft pulp, papergrade sulfite pulp, and three products (fine paper, tissue, and clay-coated printing papers). Two of the products (fine paper and tissue) Acme Paper manufactures fall under two segments of Subpart B. In addition, the Subpart E regulations also apply to the tissue production. The third product (clay-coated printing papers) is comprised of bleached papergrade sulfite pulp and, therefore, falls under Segment E. Because BPT ELGs for conventional pollutants and BAT for AOX and chloroform are mass-based, you must review the production information submitted with the mill's permit application to determine appropriate production rates for each product and for bleached pulp to calculate their BPT and BAT limits.

The table below explains how to calculate production rates (also see Section 8 for a description of how to determine production rates).

CASE STUDY # 3

In reviewing the monthly production data for Acme Paper Company from the last five years, you find that the maximum 12-month production occurred from April 1998 - March 1999. The monthly production data from this time period will determine the production rate that results in the maximum permit limits for conventional pollutants, AOX, and chloroform.

Date	Bleached Kraft Pulp Production (ADMT/mo)	Bleached Sulfite Pulp Production (ADMT/mo)	Fine Paper Production (OMMT/mo)	Tissue Production (OMMT/mo)	Printing Paper Production (OMMT/mo)
April 1998	26,900	17,100	16,300	14,600	13,400
May 1998	26,100	17,300	15,800	14,500	13,400
June 1998	26,250	17,500	15,750	14,500	13,500
July 1998	26,800	17,700	15,300	14,400	13,600
August 1998	26,250	17,900	15,800	14,100	13,700
September 1998	26,100	17,600	16,300	14,600	13,500
October 1998	26,300	17,500	15,750	14,850	13,400
November 1998	27,000	17,600	15,750	14,400	13,200
December 1998	26,300	17,300	15,400	14,500	13,100
January 1999	26,100	17,400	15,950	14,850	13,100
February 1999	25,500	17,500	15,500	14,900	13,400
March 1999	25,400	17,600	15,400	14,800	13,700
Production Total (ADMT or OMMT/yr)	**315,000**	**210,000**	**189,000**	**175,000**	**161,000**
Total Op. Days/Year	**350**	**350**	**350**	**350**	**350**
Production Total (ADMT or OMMT/day)	**900**	**600**	**540**	**500***	**460**

*The tissue production is comprised of 360 OMMT/day bleached kraft pulp and 140 OMMT/day bleached sulfite pulp.

Determining Permit Limits for Pollutants Regulated Under BPT

You may then calculate conventional pollutant permit limits using the following equation:

$$\text{Final Effluent Limit} = \sum (PROD_i \times Limit_i)$$

where:

$PROD_i$	=	Production rate
$LIMIT_i$	=	ELG for conventional pollutant
i	=	Subpart B - Fine paper segment; Subpart B - paperboard, coarse paper, and tissue segment; and Subpart E - papergrade sulfite with vacuum or pressure drum segment

$$\text{Final Effluent Limit} = (\text{PROD}_{\text{Subpart G - fine paper}} \times \text{LIMIT}_{\text{Subpart B - fine paper}}) + (\text{PROD}_{\text{Subpart E - vacuum or pressure drum}} \times \text{LIMIT}_{\text{Subpart E - vacuum or pressure drum}})$$

The table below presents the conventional pollutant permit limits calculated for this mill.

Subcategory	Segment	Production	TSS				BOD			
			Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
			ELG	Subtotal	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
Subpart B	Fine Paper	540 kkg/day	22.15 kg/kkg	12,000 kg/day	11.9 kg/kkg	6,430 kg/day	10.6 kg/kkg	5,720 kg/day	5.5 kg/kkg	3,000 kg/day
Subpart B	Paperboard, Coarse Paper, and Tissue	360 kkg/day	24.0 kg/kkg	8,600 kg/day	12.9 kg/kkg	4,600 kg/day	13.65 kg/kkg	4,900 kg/day	7.1 kg/kkg	2,600 kg/day
Subpart E	Papergrade Sulfite with Vacuum or Pressure Drum (bisulfite liquor/surface condenser)	600 kkg/day	43.95 kg/kkg	26,370 kg/day	23.65 kg/kkg	14,190 kg/day	26.7 kg/kkg	16,020 kg/day	13.9 kg/kkg	8,340 kg/day
BPT Final Effluent Limit Totals			46,970 kg/day		25,220 kg/day		26,640 kg/day		13,940 kg/day	

Determining Permit Limits for Pollutants Regulated Under BAT

The bleaching operations at Acme Paper are covered under Subparts B and E. Subpart B ELGs for the regulated toxic and nonconventional pollutants are either concentration- or mass-based permit limits. For concentration-based limits, you must simply include the limit specified in 40 CFR 430.24 for each pollutant as the permit limit. The Subpart E BAT ELGs for TCDD, TCDF, chloroform, and 12 chlorinated compounds do not apply to fiber lines that use a TCF bleaching process. Since this mill's bleached sulfite pulping process does use TCF bleaching, there are no limits for these pollutants. Limits for AOX and COD are reserved under BAT for this subpart.

CASE STUDY #3

In your review of the permit application, you determine that the following production rate results in maximum AOX and chloroform permit limits for the Subpart B operations.

Date	Bleached Kraft Pulp Production (ADMT/mo)
April 1998	26,900
May 1998	26,100
June 1998	26,250
July 1998	26,800
August 1998	26,250
September 1998	26,100
October 1998	26,300
November 1998	27,000
December 1998	26,300
January 1999	26,100
February 1999	25,500
March 1999	25,400
Production Total (ADMT/year)	**315,000**
Total Op. Days/year	**350**
Production Total (ADMT/day)	**900**

Acme Paper provided a 10% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. As a result, you can calculate the production rate for determining AOX and chloroform permit limits as follows:

900/(1-0.10) = 1,000 ADMT = 1,000 kkg of unbleached papergrade kraft pulp entering the bleach plant.

Example: Concentration-Based Limit Calculation

TCDF: Maximum for one day = 31.9 pg/L

Example: Mass-Based Limit Calculation

For mass-based limits established in Subpart B, you must calculate the kraft mill fiber line's production rate of unbleached kraft pulp entering the first stage of the bleach plant. Using the maximum production time period illustrated above, the following table explains how to calculate the production rate (also see Section 8 for a description of how to determine production rate).

Because the only BAT ELG for this segment is <ML for AOX in final effluent, you must base final permit limits on the load attributable to the bleached kraft fiber line. This is demonstrated in the calculation below. You may then determine permit limits for AOX by using the following equation:

$$\text{Final Effluent Limit} = \sum (\text{PROD}_i \times \text{LIMIT}_i)$$

where:

PROD_i	=	BPT production; and
LIMIT_i	=	AOX pollutant limit for specific bleached papergrade kraft product or AOX pollutant limit for papergrade sulfite mill washing/pulping operation.
i	=	Subpart B BPT product segment or Subpart E BPT operation segment.

$$\text{Final Effluent Limit} = (\text{PROD}_{\text{fine paper}} \times \text{LIMIT}_{\text{fine paper}}) + (\text{PROD}_{\text{tissue}} \times \text{LIMIT}_{\text{tissue}}) + (\text{PROD}_{\text{printing paper}} \times \text{LIMIT}_{\text{papergrade sulfite mill with continuous digester}})$$

Mill	Production	Chloroform				AOX			
		Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
		ELG	Total	ELG	Total	ELG	Total	ELG	Total
Bleached Papergrade Kraft	1,000 kkg/day	6.92 g/kkg	6.9 kg/day	4.14 g/kkg	4.1 kg/day	0.951 kg/kkg	951 kg/day	0.623 kg/kkg	623 kg/day

Final Permit Limits for Acme Paper

Table 11-4 presents the permit limits for Acme Paper Company. Under the Clean Water Act, the NPDES permit must require immediate compliance with the new limitations. The permit is being reissued in August of 2000 (almost two years after the promulgation of the final rule), and you are requiring the mill to comply with permit limits for chlorinated pollutants immediately. As shown in the table, you exercised BPJ to include the following in the permit:

1. COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and

3. Mandatory flow measurements of bleach plant and final effluent.

Make sure you also include the following in the permit:

- Because AOX and COD limits are reserved, a reopener clause so that you may include AOX and COD permit limits when EPA promulgates ELGs for these pollutants (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-4. Permit Limits for Acme Paper Company

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
TCDF	31.9 pg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Chloroform	6.9 kg/day	4.1 kg/day	Kraft Mill Fiber Line BPE**	Weekly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
AOX	951 kg/day	623 kg/day	Final Effluent	Daily	24 hr composite
COD*	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	26,640 kg/day	13,440 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	46,970 kg/day	25,220 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	Kraft Mill Fiber Line BPE	Continuous	Recorder
Flow*	Report	Report	Sulfite Mill Fiber Line BPE	Continuous	Recorder
Flow*	Report	Report	Final Effluent	Continuous	Recorder

"--" Monthly averages do not apply for pollutant.

BPE - Bleach Plant Effluent.

*Reporting for COD and flow based on BPJ.

**Acid and alkaline streams monitored separately.

Case Study #4

Pulpco Corporation is an integrated pulp and paper mill that manufactures paperboard and three types of market pulp. Pulpco operates a bleached papergrade kraft fiber line, a secondary deink fiber line, and a thermo-mechanical fiber line. All process wastewaters generated by Pulpco Corporation are treated using primary and secondary treatment prior to discharge into the Murray River. The mill has submitted a permit application because their current NPDES permit expires December 2000.

Case Study #4 highlights:

1. Permit process for mills with operations in multiple subparts (Subparts B, G, I).
2. Production rate determination.

General Site Description

Pulpco operates a bleached kraft fiber line producing bleached pulp that is either sold as market pulp or used to manufacture paperboard. Pulpco uses some of the secondary deink fiber in their paperboard production. The secondary deink fiber makes up 10% of the paperboard while the rest is sold to other paper manufacturers for use in a variety of products. All of the thermo-mechanical pulp is sold to a newsprint manufacturer.

Relevant Information for Establishing Permit Limits

The table below summarizes the relevant information from the permit application you need to calculate discharge limits for the reissued NPDES permit.

Information Needed to Establish Permit Limits for Case Study #4	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subparts B, G, and I
The mill is subject to which ELG&S?	Subpart B BPT (40 CFR 430.22) Market Bleached Kraft Pulp Segment Paperboard, Coarse Paper, and Tissue Segment BAT (40 CFR 430.24) Subpart G BPT (40 CFR 430.72) Pulp and Paper at Groundwood Mills Through the Application of Thermo-mechanical Process Segment BAT (40 CFR 430.74) Subpart I BPT (40 CFR 430.92) BAT (40 CFR 430.94)
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use chlorophenolic biocides?	No

Determining Permit Limits for Pollutants Regulated Under BPT

Pulpco manufactures two products (paperboard and bleached market pulp) that fall under two segments of Subpart B. The secondary fiber deink production is subject to BPT ELGs for Subpart I. The thermo-mechanical pulp production falls under one segment (i.e., the Pulp and Paper at Groundwood Mills Through the Application of Thermo-Mechanical Process Segment) of Subpart G. Because BPT ELGs are mass-based, you must review their permit application to determine production rates for each product to calculate their BPT limits. The table below explains how to calculate production rates (also see Section 8 for a description of how to calculate production rates).

CASE STUDY # 4

In reviewing the monthly production data for Pulpco from the last five years, you find that the maximum production occurred from November 1997 - October 1998. The monthly production data from this time period will determine the production rate that results in the maximum permit limits for conventional pollutants.

Date	Coated Paperboard Production (OMMT/mo)	Market Pulp Production (OMMT/mo)	Secondary Deink Fiber (ADMT/mo)	Thermo-Mechanical Pulp (ADMT/mo)
11/97	29,500	11,100	8,000	8,900
12/97	29,100	11,300	7,500	8,750
1/98	29,150	12,400	7,900	8,200
2/98	29,000	11,200	7,900	8,400
3/98	28,950	12,500	8,000	8,750
4/98	29,100	11,200	7,600	8,750
5/98	28,590	11,400	7,200	8,100
6/98	29,150	1,600	7,800	8,750
7/98	29,500	11,700	7,900	9,100
8/98	29,100	11,900	8,000	9,300
9/98	29,000	11,800	8,000	9,000
10/98	29,500	11,900	8,000	9,000
Production Total (ADMT or OMMT/yr)	**350,000**	**140,000**	**93,800**	**105,000**
Total Op. Days/Year	**350**	**350**	**350**	**350**
Production Total (ADMT or OMMT/day)	**1,000**	**400**	**268**	**300**

Approximately 10% of paperboard is comprised of secondary deink fiber (or approximately 100 ADMT/year). As a result, you can calculate the production rate for Paperboard, Coarse Paper, and Tissue subject to Subpart B ELGs as follows:

Production rate for Paperboard, Coarse Paper, and Tissue subject to Subpart B ELGs
= 1,000 ADMT/day - 100 ADMT/day = 900 ADMT/day
= 900 kkg/day

You may then calculate conventional pollutant permit limits using the following equation:

$$\text{Final Effluent Limit} = \sum (PROD_i \times Limit_i)$$

where:

$PROD_i$ = Production rate
$LIMIT_i$ = ELG for conventional pollutant
i = Segment

$$\text{Final Limit} = (PROD_{\text{paperboard}} \times LIMIT_{\text{paperboard}}) + (PROD_{\text{bleach kraft pulp}}) \times LIMIT_{\text{bleach kraft pulp}}) + (PROD_{\text{thermo-mechanical pulp}} \times LIMIT_{\text{thermo-mechanical pulp}}) + (PROD_{\text{secondary deink fiber}} \times LIMIT_{\text{secondary deink fiber}})$$

The table below presents the calculation of conventional pollutant permit limits calculated for this mill.

			TSS				BOD			
			Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
Subcategory	**Segment**	**Production**	**ELG**	**Subtotal**	**ELG**	**Subtotal**	**ELG**	**Subtotal**	**ELG**	**Subtotal**
Subpart B	Market Pulp	400 kkg/day	30.4 kg/kkg	12,200 kg/day	16.4 kg/kkg	6,560 kg/day	15.45 kg/kkg	6,180 kg/day	8.05 kg/kkg	3,220 kg/day
Subpart B	Paperboard, Coarse Paper, and Tissue	900 kkg/day	24.0 kg/kkg	21,600 kg/day	12.9 kg/kkg	11,610 kg/day	13.65 kg/kkg	12,280 kg/day	7.1 kg/kkg	6,390 kg/day
Subpart G	Thermo-mechanical	300 kkg/day	15.55 kg/kkg	4,670 kg/day	8.35 kg/kkg	2,510 kg/day	10.6 kg/kkg	3,180 kg/day	5.55 kg/kkg	1,670 kg/day
Subpart I	Secondary Fiber Deink	268 kkg/day	24.05 kg/kkg	6,450 kg/day	12.95 kg/kkg	3,470 kg/day	18.1 kg/kkg	4,850 kg/day	9.4 kg/kkg	2,520 kg/day
BPT Effluent Limit Totals			44,920 kg/day		24,150 kg/day		26,500 kg/day		13,800 kg/day	

Determining Permit Limits for Pollutants Regulated Under BAT

The bleaching operations at Pulpco are covered under Subpart B. (Note that the secondary fiber deink line does not bleach and you do not expect any chlorinated pollutants from this line.) BAT ELGs for the regulated toxic and nonconventional pollutants are either concentration-based or mass-based. For concentration-based ELGs, you may simply include the limits specified in 40 CFR 430.24 for each pollutant as the permit limit.

Example: Concentration-Based Limit Calculation

TCDF: Maximum for one day = 31.9 pg/L
TCDD: Maximum for one day: <ML: Method 1613 ML for TCDD = 10 pg/L. Therefore,
Maximum for one day: <10 pg/L

Example: Mass-Based Limit Calculation

For mass-based ELGs, such as those for chloroform and AOX, you must calculate the production rate of unbleached pulp entering the bleach plant. Using the maximum production rate time period illustrated above, the following table explains how to calculate the production rate for these pollutants (also see Section 8 for a description of how to determine production rate).

CASE STUDY #4

In your review of Pulpco's permit application, you determine that the following production rate results in the maximum AOX and chloroform permit limits.

Date	Bleached Kraft Pulp Production (ADMT)
11/97	37,500
12/97	37,500
1/98	37,900
2/98	38,100
3/98	38,400
4/98	38,000
5/98	38,300
6/98	38,300
7/98	37,500
8/98	37,600
9/98	37,900
10/98	38,000
Total Production (ADMT/year)	**455,000**
Total Op. Days/Year	**350**
Total Production (ADMT/day)	**1,300**

Pulpco provided a 10% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. As a result, the production rate for calculating AOX and chloroform permit limits is as follows:

1,300 ADMT/(1-0.10) = 1,444 ADMT of unbleached papergrade kraft pulp entering the bleach plant.

You may then determine permit limits for AOX and chloroform using the following equation:

Bleach plant or final effluent limit = PROD × LIMIT

where:

PROD = Production rate for AOX and chloroform; and
LIMIT = Toxic and nonconventional pollutant ELG.

> **ALERT!** Remember, chloroform is limited in bleach plant effluent while AOX is limited in final effluent.

The table below presents the limits calculated for AOX and chloroform.

		Chloroform				AOX			
		Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
Subcategory	Production	ELG	Total	ELG	Total	ELG	Total	ELG	Total
Subpart B	1,444 kkg/day	6.92 g/kkg	9.99 kg/day	4.14 g/kkg	5.98 kg/day	0.951 kg/kkg	1,270 kg/day	0.623 kg/kkg	830 kg/day

Final Permit Limits for Pulpco Corporation

Table 11-5 presents the permit limits for Pulpco. Under the Clean Water Act, the NPDES permit must require immediate compliance with the new limitations. The permit is being reissued in December 2000 (over two years after the promulgation of the final rule), and you are requiring the mill to comply with permit limits for chlorinated pollutants immediately. Also shown in the table, you exercised BPJ to include the following in the permit:

1. COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and
3. Mandatory flow measurements of bleach plant and final effluent.

Make sure you also include the following in the permit:

- A reopener clause so that you may include COD permit limits when EPA promulgates ELGs for this pollutant (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-5: Permit Limits for Pulpco Corporation

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
TCDF	31.9 pg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Chloroform	10.0 kg/day	6.0 kg/day	Kraft Mill Fiber Line BPE	Weekly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
AOX	1,270 kg/day	830 kg/day	Final Effluent	Daily	24 hr composite
COD*	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	26,500 kg/day	13,800 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	44,920 kg/day	24,150 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	Kraft Mill Fiber Line BPE	Continuous	Recorder
Flow*	Report	Report	Final Effluent	Continuous	Recorder

*Reporting for COD and flow based on BPJ.

Case Study #5

Case Study #5 highlights:

1. Production rate determination.
2. Permit limits for non-continuous dischargers.

United Papers Corporation is an integrated pulp and paper mill that manufactures office paper and market pulp. All process wastewaters generated by United Paper are treated and discharged to a holding pond. The mill discharges wastewater to Johnstone Creek nine months of the year. Wastewater is not discharged during July, August, and September due to Johnstone Creek's low flow and inability to assimilate oxygen-demanding wastewater during these months. The mill has submitted a permit application because their current NPDES permit expires January 2001.

General Site Description

United Papers operates a bleached papergrade kraft fiber line and two paper machines. In 1998, the mill purchased a second paper machine to increase office paper production. United Paper reduced the amount of market pulp sold to paper manufacturers and used the pulp for their increased office paper production.

Relevant Information for Establishing Permit Limits

The table below summarizes the relevant information from the permit application you need to calculate discharge limits for the reissued permit.

Information Needed to Establish Permit Limits for Case Study #5	
What type of discharger is the mill?	Direct (non-continuous discharger)
Under which subpart(s) do the mill's operations fall?	Subpart B
The mill is subject to which ELG&S?	BPT (40 CFR 430.22) Fine Paper Segment Market Bleached Kraft Pulp Segment BAT (40 CFR 430.24)
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use chlorophenolic biocides?	No

United Papers manufactures bleached kraft pulp and two products (office papers and bleached market pulp) that fall under two segments of Subpart B. Note that as a non-continuous discharger, the mill is subject to annual average permit limits, rather than maximum one-day and 30-day permit limits, for conventional pollutants regulated in final effluent. Because BPT ELGs for conventional pollutants and BAT for AOX and chloroform are mass-based, you must review the production information submitted with the mill's permit application to determine production rates for both products and bleached pulp to calculate their BPT and BAT limits. The table below explains how to calculate production rates for United Papers (also see Section 8 for a description of how to calculate production rates).

ALERT! Non-continuous discharge mills are subject to annual average ELGs for conventional pollutants; however, maximum one-day and 30-day average limitations may be required to protect receiving water quality.

CASE STUDY #5

In reviewing the monthly production data for United Papers from the last five years, you find that the maximum production occurred from September 1998 - August 1999. The monthly production data form this time period will determine the production rate that results in the maximum permit limits for conventional pollutants, AOX, and chloroform.

Date	Bleached Kraft Pulp Production (ADMT/mo)	Fine Paper Production (OMMT/mo)	Market Pulp Production (ADMT/mo)
9/98	33,300	20,700	12,600
10/98	32,600	20,400	12,200
11/98	32,900	20,500	12,400
12/98	32,750	20,100	12,650
1/99	32,850	20,350	12,500
2/99	32,600	20,100	12,500
3/99	33,800	20,600	13,200
4/99	33,250	20,350	12,900
5/99	32,700	20,100	12,600
6/99	34,000	20,600	13,400
7/99	33,000	20,400	12,600
8/99	33,500	20,800	12,700
Total Production (ADMT or OMMT/yr)	**397,250**	**245,000**	**152,250**
Total Op. Days/Year	**350**	**350**	**350**
Total Production (ADMT or OMMT/day	**1,135**	**700**	**435**

Determining Permit Limits for Pollutants Regulated Under BPT

You may then calculate conventional pollutant permit limits using the following equation:

$$\text{Final Effluent Limit} = \sum (\text{PROD}_i \times \text{Limit}_i)$$

where:

PROD_i	=	Production rate
LIMIT_i	=	ELGs for conventional pollutant
i	=	Segment

$$\text{Final effluent limit} = (\text{PROD}_{\text{fine paper}} \times \text{LIMIT}_{\text{fine paper}}) + (\text{PROD}_{\text{market pulp}} \times \text{LIMIT}_{\text{market pulp}})$$

The table below presents the conventional pollutant permit limit calculated for this mill.

Subcategory	Segment	Production	TSS		BOD	
			Annual Average		Annual Average	
			ELG	Subtotal	ELG.	Subtotal
Subpart B	Fine Paper	700 kkg/day	6.54 kg/kkg	4,580 kg/kkg	3.09 kg/kkg	2,160 kg/day
Subpart B	Market Pulp	435 kkg/day	9.01 kg/kkg	3,920 kg/day	4.52 kg/kkg	2,000 kg/day
BPT Final Effluent Limit Totals			8,500 kg/day		4,160 kg/day	

Determining Permit Limits for Pollutants Regulated Under BAT

The bleaching operations at United Papers are covered under Subpart B. Although United Papers non-continuously discharges final effluent, the mill performs bleach plant operations continuously and, therefore, bleach plant effluent is continuously generated. As a result, the ELGs for those pollutants limited in bleach plant effluent are equivalent to those for direct dischargers.

BAT ELGs for the regulated toxic and nonconventional pollutants are either concentration-based or mass-based. For concentration-based ELGs, you may simply include the limits specified in 40 CFR 430.24 for each pollutant as the permit limit.

Examples: Concentration-Based Limit Calculation

TCDF: Maximum for one day = 31.9 pg/L
TCDD: Maximum for one day: <ML: Method 1613 ML for TCDD = 10 pg/L. Therefore,
Maximum for one day: <10 pg/L

Example: Mass-Base Limit Calculation

For mass-based ELGs, such as those for chloroform and AOX, you must calculate the production rate of unbleached pulp entering the bleach plant. Using the maximum production time period

illustrated above, the following table explains how to calculate the production rate for these pollutants (also see Section 8 for a description of how to determine production rate).

CASE STUDY #5

In your review of United Papers' permit application, you determine that the following production rate results in the maximum AOX and chloroform permit limits.

Date	Bleached Kraft Pulp Production (ADMT)
9/98	33,300
10/98	32,600
11/98	32,900
12/98	32,750
1/99	32,850
2/99	32,600
3/99	33,800
4/99	33,250
5/99	32,700
6/99	34,000
7/99	33,000
8/99	33,500
Total Production (ADMT/year)	**397,250**
Total Op. Days/Year	**350**
Total Production (ADMT/day)	**1,135**

United Papers provided an 8% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. As a result, the production rate for calculating AOX and chloroform permit limits is as follows:

1,135/(1-0.08) = 1,230 ADMT/day of unbleached papergrade kraft pulp entering the bleach plant.

You may then determine permit limits for AOX and chloroform by using the following equation:

Bleach plant or final effluent limit = PROD × LIMIT

where:

PROD	=	Production rate for AOX and chloroform; and
LIMIT	=	Toxic and nonconventional pollutant ELG

> **ALERT!** Remember, chloroform is limited in bleach plant effluent while AOX is limited in final effluent.

The table below presents the limits calculated for AOX and chloroform.

		Chloroform				AOX	
		Daily Maximum		Monthly Average		Annual Average	
Subcategory	Production	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
Subpart B	1,230 kkg/day	6.92 g/kkg	8.51 kg/day	4.14 g/kkg	5.09 kg/day	0.512 kg/kkg	630 kg/day

Final Permit Limits for United Papers Corporation

Table 11-6 presents the permit limits for United Papers Corporation. Under the Clean Water Act, the NPDES permit must require immediate compliance with the new limitations. The permit is being reissued in January of 2001 (which is over a year after the promulgation of the final rule), and you are requiring the mill to comply with permit limits for chlorinated pollutants immediately. Also shown in Table 11-6, you exercised BPJ to include the following in the permit:

1. COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and
3. Mandatory flow measurements of bleach plant and final effluent.

Make sure you also include the following in the permit:

- A reopener clause so that you may include COD permit limits when EPA promulgates ELGs for this pollutant (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-6: Permit Limits for United Papers Corporation

Pollutant	Permit Limits			Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1-Day Maximum	Monthly Average	Annual Average			
TCDD	<10 pg/L	--	--	BPE	Monthly	24 hr composite
TCDF	31.9 pg/L	--	--	BPE	Monthly	24 hr composite
Chloroform	8.51 kg/day	5.09 kg/day	--	BPE	Weekly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	--	BPE	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	--	BPE	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	--	BPE	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	--	BPE	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	--	BPE	Monthly	24 hr composite
AOX			630 kg/day	Final Effluent	Daily	24 hr composite
COD*	Report	--	--	Final Effluent	Weekly	24 hr composite
BOD_5	–		4,160 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	--		8,500 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	Report	BPE	Continuous	Recorder
Flow*	Report	Report	Report	Final Effluent	Continuous	Recorder

*Reporting for COD and flow based on BPJ.

Case Study #6

PaperTech Corporation manufactures market pulp and fine paper. The company has two bleached kraft fiber lines, one of which was recently installed. All process wastewaters generated by PaperTech are treated using primary and secondary treatment prior to discharge into the Jackson River. The mill has submitted a permit application since they are to begin operation of their new fiber line in March 2001.

Case Study #6 highlights:

1. Permit process for mill that triggers NSPS.
2. Permit limits that include NSPS conventional pollutant contribution.
3. Production rate projections for new mill operations.

General Site Description

PaperTech operates two bleached kraft fiber lines. The existing line (Fiber line #1) produces bleached pulp that is used to manufacture market pulp and fine papers. To expand operations, PaperTech has installed a new bleached kraft fiber line and paper machine. PaperTech's new line (Fiber line #2) has a capacity to produce 583 ADMT/yr of bleached kraft pulp to produce fine papers.

Relevant Information for Establishing Permit Limits

The table below summarizes relevant information from the permit applications you need to calculate discharge limits for the NPDES permit. Note that the Fiber line #2 triggers new source requirements and is subject to NSPS. Fiber line #1 remains subject to existing source requirements and is subject to BAT and BPT.

Relevant Information for Establishing Permit Limits for Case Study #6	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subpart B
The mill is subject to which ELG&S?	Subpart B *Fiber Line #1* BPT (40 CFR 430.22) Fine Paper Segment Market Bleached Kraft Pulp Segment BAT (40 CFR 430.24) *Fiber Line #2* NSPS (40 CFR 430.25)
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use biocides?	No

Determining Permit Limits for Conventional Pollutants Regulated Under BPT and NSPS

Both products (market pulp and fine paper) manufactured by PaperTech fall under two segments of Subpart B. The ELG&S for conventional pollutants are mass-based. As a result, you must review the production information submitted with the mill's permit application to determine appropriate production rates for calculating conventional pollutant limits. Note that the production must be separated by the portion attributable to each line. You must apply BPT for the market pulp and fine paper production attributable to Fiber line #1 and NSPS for the fine paper production attributable to Fiber line #2.

CASE STUDY # 6

In reviewing the monthly production data for Paper Tech from the last five years, you find that the maximum production occurred from September 1999 - August 2000. The monthly production data from this time period will determine the production rate that results in the maximum permit limits for conventional pollutants.

Date	Fine Paper Production (OMMT)	Market Pulp Production (ADMT)
9/99	17,500	3,200
10/99	17,400	2,900
11/99	17,800	2,700
12/99	18,000	3,300
1/00	17,400	2,800
2/00	18,000	2,700
3/00	17,500	3,300
4/00	17,200	2,700
5/00	17,000	2,400
6/00	17,200	2,900
7/00	17,500	2,900
8/00	17,500	3,200
Total Production (ADMT or OMMT/yr)	**210,000**	**35,000**
Total Op. Days/Year	**350**	**350**
Total Production (ADMT or OMMT/day)	**600**	**100**

Starting in March 2001, PaperTech expects to continue to produce approximately 600 OMMT of fine paper and 100 ADMT of market pulp as well as the projected 700 OMMT of fine paper from their new paper machine. As a result, you should must determine conventional pollutant limits that also account for the new production.

You may then calculate conventional pollutant permit limits using the following equation:

$$\text{Final Effluent} = \sum (PROD_i \times LIMIT_i)$$

where:

$PROD_i$	=	BPT or NSPS production for conventional pollutants; and
$LIMIT_i$	=	Conventional pollutant effluent limitation guideline for appropriate BPT or NSPS segment; and
i	=	Segment.

$$\text{Final Effluent Limit} = \text{Fiberline \#1} + \text{Fiberline \#2}$$
$$= (\text{PROD}_{\text{fine paper}} \times \text{LIMIT}_{\text{BPT for fine paper}}) + (\text{PROD}_{\text{BPT for market pulp}} \times \text{LIMIT}_{\text{BPT for market pulp}}) +$$
$$(\text{PROD}_{\text{fine paper}} \times \text{LIMIT}_{\text{NSPS for market pulp}})$$

The table below presents the conventional pollutant permit limits calculated for this mill.

Subpart	Fiber line	Guideline or Standard	Segment	Production	TSS				BOD			
					Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
					ELG	Subtotal	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
B	#1	BAT	Fine Paper	600 kkg/day	22.15 kg/kkg	13,300 kg/day	11.9 kg/kkg	7,140 kg/day	10.6 kg/kkg	6,360 kg/day	5.5 kg/kkg	3,300 kg/day
			Market Pulp	100 kkg/day	30.4 kg/kkg	3,040 kg/day	16.4 kg/kkg	1,640 kg/day	15.45 kg/kkg	1,550 kg/day	8.05 kg/kkg	805 kg/day
	#2	NSPS	Fine Paper	700 kkg/day	9.1 kg/kkg	6,400 kg/day	4.8 kg/kkg	3,400 kg/day	5.7 kg/kkg	4,000 kg/day	3.1 kg/kkg	2,200 kg/day
Limit Totals					22,740 kg/day		12,180 kg/day		11,910 kg/day		6,305 kg/day	

Determining Permit Limits for Pollutants Regulated Under BAT

PaperTech is subject to BAT ELGs for mills with operations in Subpart B. You must establish concentration- and mass-based permit limits. For concentration-based limits, you must include the concentration value specified in 40 CFR 430.24 for each pollutant as the permit limit. Note that permit limits for those pollutants regulated in bleach plant effluent must be established for each fiber line.

> **Alert!** PaperTech operates two fiber lines that discharge bleach plant effluent. You must establish permit limits for those pollutants regulated in bleach plant effluent for each fiber line.

Example: Concentration-Based Limit Calculation

TCDF: Maximum for one day = 31.9 pg/L
TCDD: Maximum for one day = <ML for Test Method 1613 = <10 pg/L
Therefore, the maximum for one day: <10 pg/L

Example: Mass-Based Limit Calculation

For mass-based limits established in Subpart B, you must calculate the production rate of unbleached kraft pulp entering the first stage of each bleach plant. You must review PaperTech's permit application to determine production rate so that you can calculate AOX and chloroform permit limits. You must assume the projected production for Fiber line #2. Using the maximum production period illustrated above, the following table presents the fiber line production rate to use for PaperTech.

CASE STUDY #6

In your review of PaperTech's permit application, you determine that the following production rate that results in the maximum AOX and chloroform permit limits.

Date	Fiber Line #1 Bleached Kraft Pulp Production (ADMT)
9/99	17,500
10/99	17,400
11/99	17,800
12/99	18,000
1/00	17,400
2/00	18,000
3/00	17,500
4/00	17,200
5/00	17,000
6/00	17,200
7/00	17,500
8/00	17,500
Total Production (ADMT/year)	**210,000**
Total Op. Days/Year	**350**
Total Production (ADMT/year)	**600**

In their permit application, PaperTech provided a 4% shrinkage factor for the bleached papergrade kraft pulp production data for Fiber line #1. As a result, the production rate for calculating AOX and chloroform permit limits is as follows:

600/(1-0.04) = 625 ADMT of unbleached papergrade kraft pulp entering the bleach plant.

PaperTech projects that their new fiber line, at full capacity, will produce 583 ADMT/yr of bleached kraft pulp. In mill studies, PaperTech calculated that the softwood furnish will experience 8% shrinkage during bleaching operations. As a result, the production rate for calculating AOX and chloroform permit limits is as follows:

583/(1-0.08) = 634 ADMT of unbleached papergrade kraft pulp entering the bleach plant.

You may then determine permit limits for AOX and chloroform by using the following equation:

Bleach plant or final effluent limit = PROD × LIMIT

where:

PROD = Production rate for AOX and chloroform; and
LIMIT = Toxic and nonconventional pollutant ELG.

> **Alert!** Remember, chloroform is limited in bleach plant effluent while AOX is limited in final effluent.

The table below presents the limits calculated for AOX and chloroform.

Subpart	Fiberline	Guideline or Standard	Production	Chloroform				AOX			
				Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
				ELG	Subtotal	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
Subpart B	#1	BAT	625 kkg/day	6.92 g/kkg	4.33 kg/day	4.14 g/kkg	2.59 kg/day	0.951 kg/kkg	594 kg/day	0.623 kg/kkg	389 kg/day
	#2	NSPS	634 kkg/day	6.92 g/kkg	4.39 kg/day	4.14 g/kkg	2.62 kg/day	0.476 kg/kkg	302 kg/day	0.272 kg/kkg	172 kg/day
Toxic and Nonconventional Limit Totals				8.72 kg/day		3.21 kg/day		896 kg/day		561 kg/day	

Final Permit Limits for PaperTech Corporation

Table 11-7 presents the permit limits for PaperTech. Under the Clean Water Act, the NPDES permit must require immediate compliance with the new limitations. The permit is being reissued in March 2001 (which is almost two years after the promulgation of the final rule), you are requiring the mills to comply with permit limits for chlorinated pollutants immediately. As shown in Table 11-7, you exercised BPJ to include the following in the permit:

1. COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and
3. Mandatory flow measurements of bleach plant and final effluent.

Make sure you include the following in the permit:

- A reopener clause so that you may include COD permit limits when EPA promulgates ELGs for this pollutant (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-7: Permit Limits for PaperTech Corporation

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1-Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
TCDD	<10 pg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
TCDF	31.9 pg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
TCDF	31.9 pg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
Chloroform	4.33 kg/day	2.59 kg/day	BPE for Fiber Line #1	Weekly	24 hr composite
Chloroform	4.39 kg/day	2.62 kg/day	BPE for Fiber Line #2	Weekly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1-Day Maximum	Monthly Average			
2,4,6-Trichlorophenol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	BPE for Fiber Line #2		
Tetrachloroguaiacol	<5.0 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	BPE for Fiber Line #2		
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
AOX	896 kg/day	561 kg/day	Final Effluent	Daily	24 hr composite
COD*	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	11,910 kg/day	6,305 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	22,740 kg/day	12,180 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	BPE for Fiber Line #1	Continuous	Recorder
Flow*	Report	Report	BPE for Fiber Line #2	Continuous	Recorder
Flow*	Report	Report	Final Effluent	Continuous	Recorder

"--" Monthly averages do not apply for pollutant.

BPE - Bleach Plant Effluent.

*Reporting for COD and flow based on BPJ.

Case Study #7

Commerce Pulp Company manufactures market pulp and printing papers. The company operates a bleached kraft fiber line. All process wastewaters generated by Commerce Pulp is sent to the Sutton City POTW. The POTW is revising the pretreatment control agreement to include discharge limits for chlorinated pollutants.

Case Study #7 highlights:

1. Pretreatment control agreements for mills with operations in Subparts B.
2. Production rate determination.

General Site Description

Commerce Pulp operates a bleached kraft fiber line that generates bleached pulp that is used to manufacture market pulp and printing papers.

Relevant Information for Establishing Pretreatment Limits

The table below summarizes relevant information for establishing a pretreatment control agreement for Commerce Pulp Company.

Information Needed to Establish Pretreatment Limits for Case Study #7	
What type of discharger is the mill?	Indirect
Under which subpart(s) do the mill's operations fall?	Subparts B
The mill is subject to which E.G.&S?	PSES (40 CFR 430.26)
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use biocides?	No

Determining Permit Limits for Toxic and Nonconventional Pollutants Regulated Under PSES

Commerce Pulp is subject to PSES for mills with operations and Subpart B. You must establish concentration- and mass-based permit limits. For concentration-based limits, you must simply denote the concentration value specified in 40 CFR 430.24 for the appropriate compliance point in the permit.

Example: Concentration-Based Limit Calculation

TCDF: Maximum for one day = 31.9 pg/L
TCDD: Maximum for one day = <ML, Method 1613 ML for TCDD = 10 pg/L
Therefore, maximum for one day = <10 pg/L

Example: Mass-Based Limit Calculation

For mass-based limits established in Subpart B, you must calculate the maximum 12-month production rate of unbleached kraft pulp entering the bleach plant. You must review the mill's monthly production information to determine this production rate so that you may calculate AOX and chloroform permit limits. The following table presents the production rate for Commerce Pulp.

CASE STUDY #7

In reviewing the monthly production data for Commerce Pulp from the last five years, you find that the maximum production occurred from January 1997 - December 1997. The monthly production data from this time period will determine the production rate that results in the maximum AOX and chloroform permit limits.

Date	Bleached Kraft Pulp Production (ADMT/month)
1/97	25,500
2/97	25,125
3/97	25,125
4/97	25,600
5/97	25,125
6/97	24,700
7/97	24,900
8/97	25,225
9/97	25,100
10/97	25,600
11/97	24,800
12/97	24,700
Total Production (ADMT/year)	**301,500**
Total Op. Days/Year	**335**
Total Production (ADMT/day)	**900**

Commerce Pulp provided an 8% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. As a result, you can calculate the production rate for determining AOX and chloroform permit limits as follows:

900/(1-0.08) = 978 ADMT = 978 kkg of unbleached papergrade kraft pulp entering the bleach plant.

You may then determine permit limits for AOX and chloroform by using the following equation:

Bleach Plant or Final Effluent Limit = PROD × LIMIT

where:

PROD	=	Production rate for AOX and chloroform; and
LIMIT	=	Toxic and nonconventional pollutant E.G.

		Chloroform				AOX			
		Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
Subcategory	Production	Standard	Total	Standard	Total	Standard	Total	Standard	Total
Subpart B	978 kkg/day	6.92 g/kkg	6.8 Kg/day	4.14 g/kkg	4.0 kg/day	2.64 kg/kkg	2,580 kg/day	1.41 kg/kkg	1,380 kg/day

Final Pretreatment Limits for Commerce Pulp

The table below presents the pretreatment limits for Commerce Pulp Company. As shown in the table, the pretreatment control authority decided to include the following in the permit:

Note. *For indirect dischargers, pretreatment limits for AOX must be established for bleach plant effluent.*

1. COD monitoring requirements.
2. Monitoring frequencies for conventional pollutants.
3. Mandatory flow measurements of bleach plant and final effluent.

In addition, the pretreatment control authority must require Commerce Pulp to implement BMPs by the schedule specified in the regulation.

Table 11-8: Permit Limits for Commerce Pulp Company

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1-Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
TCDF	31.9 pg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Chloroform	6.8 kg/day	4.0 kg/day	Bleach Plant Effluent	Weekly	6 grabs/24 hr
Trichlorosyringol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
AOX	2,580 kg/day	1,380 kg/day	Bleach Plant Effluent	Daily	24 hr composite
COD*	Report	--	End-of-Pipe Effluent	Weekly	24 hr composite
Flow*	Report	Report	Bleach Plant Effluent	Continuous	Recorder
Flow*	Report	Report	End-of-Pipe Effluent	Continuous	Recorder

"--" Monthly averages do not apply for pollutant.

*Reporting for COD and flow based on BPJ.

Case Study #8

The Great American Paper Company manufactures fine paper and paperboard. The mill, which discharges wastewater into the Redbanks River, has informed you that they wish to enter Voluntary Advanced Technology Incentives Program (VATIP). Although their NPDES permit does not expire until February 15, 2000, the company has indicated its intent to enroll in the program by submitting a letter to the permitting authority. The letter was signed by the corporate officials as specified in 40 CFR 122.22.

Case Study #8 highlights:

1. VATIP permit process
2. VATIP compliance schedules
3. Calculation of EEQ
4. VATIP monitoring requirements
5. Accelerated VATIP rewards.

General Site Description

The Great American Paper Company operates two bleached kraft fiber lines to produce fine paper and paperboard. One fiber line (Fiber Line #1) is dedicated to pulping and bleaching pine, a softwood, to produce bleached kraft pulp used in the manufacture of paperboard. In 1992, the mill installed oxygen delignification systems on Fiber line #1 to improve mill productivity and effluent quality. Fiber Line #1 currently meets BAT Tier I limits. A second fiber line (Fiber Line #2) pulps and bleaches birch, a hardwood, to produce fine paper. The mill has approved a plan to install a two-stage oxygen delignification system on Fiber line #2 by June 2003, so they can enroll Fiber Line #2 in VATIP. Pertinent process information for each fiber line, including the planned bleach sequence for Fiber Line #1, is summarized below:

Note. *Installation of oxygen delignification does not trigger NSPS. See "new source" definition in Section 7.*

Fiber line	Current Bleach Sequence	Kappa Number after Oxy Delig	Future Bleach Sequence
Fiber line #1	ODEoD	17	ODEoD
Fiber line #2	C_dEDED	12	OODED

Permitting Information

The mill has informed you that they would like to enroll both fiber lines in Tier I of VATIP. In order to immediately receive rewards associated with the program, the mill elected to by-pass EEQ and interim milestones for Fiber line #1 altogether, achieving all of the VATIP limitations for Tier 1 immediately. Because the mill does not plan to install and operate oxygen delignification on

Fiber Line #2 until June 2003, you must establish Stage 1 permit limits for Fiber Line #2 that are based on either EEQ or current permit limits (if any) for the chlorinated pollutants. The table below summarizes relevant information for establishing permit limits.

Relevant Information for Establishing Permit Limits for Case Study #8	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subpart B
The mill is subject to which ELG&S?	BPT (40 CFR 430.22) Fine Paper Segment BAT (40 CFR 430.24)
Is the mill planning on entering VATIP?	Yes, therefore, in addition to BPT, the mill is subject to the following BAT regulation under 40 CFR 430.24: 1) Immediate Stage 1 permit limits based on VATIP Tier I for Fiber line #1 and EEQ (or current permit limits) for Fiber line #2 2) Interim milestones based on progress in installing and operating two-stage OD system on Fiber line #2. Since mill intends to install and operate OD by June 2003, you should consider establishing interim milestones at or prior to that time. 3) Stage 2 permit limits that include Tier I ultimate VATIP requirements for both lines no later than April 15, 2004.
Does mill use wet barking; log washing or chip washing; or log flume or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use biocides?	No

Establishing Stage 1 Permit Limits

Remember, Stage 1 permit limits are intended to ensure that, at a minimum, existing effluent quality is maintained as the mill moves toward meeting Stage 2 permit limitations. Since Great American Paper has elected to accept Stage 2 permit limits for Fiber Line #1, permit limits as the mill enters the program must include:

1. Conventional pollutant permit limits based on BPT for the fine paper segment and the paperboard, coarse paper, and tissue segment.

2. Toxic and nonconventional pollutant permit limits for Fiber line #1 based on baseline BAT and VATIP requirement for Tier I (see Step #5 for AOX).

3. Toxic and nonconventional pollutant permit limits for Fiber line #2 based on EEQ.

4. AOX permit limits based on the load attributable to Fiber line #1 (using Tier I BAT) and the load attributable to Fiber line #2 (using EEQ).

5. A reopener clause.

Step #1 - Conventional pollutant permit limits - BPT

Great American Paper manufactures two products (fine paper and paperboard) that fall under two segments of Subpart B. Because conventional pollutant ELGs are mass-based (with the exception of pH), you must review the mill's permit application to determine production rate. The text box below presents the production rate.

A review of their permit application reveals that the production rates that result in the maximum pollutant loads are from the following data.

Date	Paperboard Segment Production Rate (OMMT/month)	Fine Paper Production Rate (OMMT/month)
12/97	22,600	18,300
1/98	22,700	17,900
2/98	22,700	17,700
3/98	22,500	18,500
4/98	22,600	18,300
5/98	22,750	18,000
6/98	22,300	17,500
7/98	23,200	17,900
8/98	22,750	17,700
9/98	22,800	18,200
10/98	23,300	18,400
11/98	22,800	18,600
Total Production (OMMT/year)	**273,000**	**217,000**
Total Op. Days/Year	**350**	**350**
Total Production (OMMT/day)	**780**	**620**

You may then calculate the conventional pollutant permit limits by using the following equation:

$$\text{Final Effluent Limit} = \sum (\text{PROD}_i \times \text{LIMIT}_i)$$

where:

PROD_i	=	Production Rate
LIMIT_i	=	ELG for conventional
i	=	Segment

$$\text{Final Effluent Limit} = (\text{PROD}_{\text{fine paper}} \times \text{LIMIT}_{\text{fine paper}}) + (\text{PROD}_{\text{paperboard}} \times \text{LIMIT}_{\text{paperboard}})$$

Refer to Table 11-X which presents the calculated Stage 1 permit limits.

Step #2 - Toxic and nonconventional pollutant permit limits for Fiber line #1 using BAT and ultimate VATIP requirements for Tier I

Because the mill elected to receive Stage 2 requirements immediately, you must establish permit limits for Fiber Line #1 based on baseline BAT for TCDD, TCDF, chloroform, and the 12 chlorinated phenolic compounds and Tier I VATIP requirements for AOX and kappa number (AOX permit limits are discussed in Step #5). With the exception of AOX and chloroform, which have mass-based ELGs, you must simply denote the concentration-based limit specified as BAT for the chlorinated pollutants limited in Fiber line #1's bleach plant effluent.

For AOX and chloroform permit limits, you must first determine the production rate of unbleached pulp entering the bleach plant. Using the maximum production time period illustrated above, the following table explains how to calculate the production rate for these pollutants (also see Section 8 for a description of how to determine production rate).

Data from the permit application that yield the production rate for AOX and chloroform for Fiber line #1.

Date	Fiber line #1 Bleached Pulp Production Rate (OMMT)
12/97	18,200
1/98	17,900
2/98	18,200
3/98	17,600
4/98	18,400
5/98	18,600
6/98	18,500
7/98	18,200
8/98	18,200
9/98	18,000
10/98	18,100
11/98	18,500
Total Production (OMMT/yr)	**218,400**
Total Op. Days/Year	**350**
Total Production (OMMT/day)	**624**

Great American Paper provided an 8% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. As a result, the production rate for calculating AOX and chloroform permit limits is as follows:

624/(1-0.08) = 687 OMMT of unbleached papergrade kraft pulp entering the bleach plant.

With the production rate, you may determine permit limits for AOX and chloroform by using the following equation:

$$\text{Bleach Plant or Final Effluent Limits} = \text{PROD} \times \text{LIMIT}$$

where:

PROD	=	Production rate for AOX and chloroform
LIMIT	=	Toxic and non-conventional pollutant ELG

Refer to Table 11-9 which presents the calculated Stage 1 permit limits.

Step #3 - Toxic and nonconventional pollutant permit limits for Fiber line #2 based on EEQ.

In their previous permit, Great American Paper was not subject to permit limits for any chlorinated pollutants. Since Great American Paper uses chlorine on Fiber Line #2, the fiber line has existing effluent quality (EEQ) that is of poorer quality than baseline BAT. As a result, you must establish permit limits for chlorinated pollutants based on EEQ (Note: EPA recommends you calculate EEQ permit limits expressed as mass/day rather than concentrations or mass per unit production). EEQ permit limits should be calculated by using mill sampling results, estimating a "long term average" (in mass/day) for each pollutant, and multiplying the long term average by a variability factor. Appendix E presents detailed calculation procedures for determining EEQ. The calculation of EEQ for AOX is shown below.

- **Step 1 - Collect Wastewater Samples**
  You receive the 30 days of data the mill has collected for AOX (with flow measurements for each sample collected).

- **Step 2 - Review Wastewater Sampling Data**
  In your review of the data, you make sure Great American did not submit multiple sampling measurements from the same day.

- **Step 3 - Calculate Mass/Day for Each Sampling Result**
  Using the data points, you calculate the mass per day of each sample collected.

AOX Data Point	Concentration	Final Effluent	Mass/Day
1	20.5 g/L	106,400,000 L/day	2,180 kg/day
2	30.1 g/L	100,000,000 L/day	3,010 kg/day
. . .	. . .	. . .	. . .
. . .	. . .	. . .	. . .
30	25.2 g/L	103,450,000 L/day	2,600 kg/day

- **Step 4 - Calculate Long-Term Averages (LTAs) for Each Pollutant**
  Using the calculated mass per day, you may determined the LTA.

AOX Data Point	Mass/Day
1	2,180 kg/day
2	3,010 kg/day
. . .	. . .
. . .	. . .
30	2,600 kg/day
LTA	2,800 kg/day

- **Step 5 - Calculate EEQ Permit Limits by Applying Variability Factors**
  Use the following variability factor suggested in Appendix E to develop the daily maximum and monthly average for AOX:

Limitation	Variability Factor (VF)	Mass/Day	VF × Mass/Day
Daily Maximum	1.86	2,800 kg/day	5,200 kg/day
Monthly Average	1.22	2,800 kg/day	3,420 kg/day

Also, you could do your own variability analysis of data if there is an adequate number of data points.

- **Step 6 - Determining AOX Load Attributable to Fiber Line #2**
  This may be determined by attributing the Fiber Line #1 fraction of total unbleached pulp production. The following table summarizes the AOX loads:

Type of Limitation	Limit	Attributable Load (a)	Limit × Attributable Load
Daily Maximum	5,200 kg/day	45%	2,340 kg/day
Monthly Average	3,480 kg/day	45%	1,530 kg/day

(a) This is calculate as Fiber Line #2 production ÷ (Fiber Line #1 + #2 production).

- **Step 7 - Compare Permit Limits Based on EEQ with Existing Permit Limits**
  Previously, Great American was not subject to AOX limits; therefore, the sum of EEQ had from Fiber Line #2 and the BAT allowable load from Fiber Line #1 serves as Stage 1 permit limit.

Step #4 - AOX permit limits based on the allowable load attributable to Fiber Line #1 using BAT and the load attributable to Fiber Line #2 using EEQ.

Because AOX is limited in final effluent, Stage 1 permit limits must equal the sum of AOX load from Fiber line #1, which is the product of the line's production rate and the baseline Tier I AOX ELG, and the AOX load from Fiber line #2, which is based on EEQ. Stage 1 permit limits are as follows:

AOX 1-Day Maximum Limit = (AOX load form Fiber Line #1 based on BAT) + (AOX load from Fiber Line #2 based on EEQ) = (687 kkg × 58 kg/kkg × 55% (production load for Line #1) + (2,340 kg from Step 3)

AOX 1-Day Maximum Limit = 2,560 kg/day

AOX Monthly Average Limit = (687 kkg × 0.58 kg/kkg ×) + (1,520 kg/day from Step 3) = 1,750 kg/day

Step #5 - Reopener clause.

Great American Paper's next permit should include a reopener clause. By including the reopener clause, you may modify permit limits at any time. This is especially important for interim milestones, which may need to be adjusted during the permit period. The interim milestones should be adjusted, if necessary, to reflect the results of research, process development, mill trials, and contingencies.

Great American Paper Stage 1 Permit. The table below presents Great American Paper's Stage 1 permit limits. Note that because Fiber Line #2 is subject to ultimate Stage 2 VATIP requirements for Tier I, the mills must perform monthly chloroform sampling on Fiber Line #1 is reduced from weekly to monthly (and then quarterly after the first year in the program).

Table 11-9: Stage 1 Permit Limits, Great American Paper

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
TCDD (a)	512 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
TCDF	31.9 pg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
TCDF (a)	620 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
Chloroform	4.7 kg/day	2.8 kg/day	BPE from Fiber line #1	Monthly (1 yr) (b)	6 grabs/24 hr
Chloroform (a)	11.7 kg/day	7.0 kg/day	BPE from Fiber line #2	Weekly	6 grabs/24 hr
Trichlorosyringol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
Trichlorosyringol (a)	31 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
3,4,5-Trichlorocatechol (a)	1,370 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
3,4,6-Trichlorocatechol (a)	375 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
3,4,5-Trichloroguaiacol (a)	1,100 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
3,4,6-Trichloroguaiacol (a)	353 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
4,5,6-Trichloroguaiacol (a)	195 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
2,4,5-Trichlorophenol (a)	235 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr)	24 hr composite
2,4,6-Trichlorophenol (a)	313 g/day	--	BPE from Fiber line #2	Monthly (b)	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
Tetrachlorocatechol (a)	391 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
Tetrachloroguaiacol (a)	509 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
2,3,4,6-Tetrachlorophenol (a)	548 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
Pentachlorophenol (a)	275 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
AOX	2,560 kg/day	1,750 kg/day	Final Effluent	Daily	24 hr composite
COD	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	14,721 kg/day	7,655 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	28,819 kg/day	16,054 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow	Report	Report	BPE from Fiber line #1	Continuous	Recorder
Flow	Report	Report	BPE from Fiber line #2	Continuous	Recorder
Flow	Report	Report	Final Effluent	Continuous	Recorder
Kappa Number	18 kappa units	--	Fiber Line #1 - pulp exiting OD system prior to bleaching		

BPE = Bleach Plant Effluent

(a) Based on EEQ.

(b) Sampling frequency reduced to quarterly after the first year because Fiber Line #2 meets Tier I Stage 2.

Intermediate Milestones

To help you update permit limits based on the mill's progress in implementing technologies, you require the Great American Paper Company to submit a Milestones Plan.

Milestones Plan

EPA published new regulatory language on July 7, 1999 in the Federal Register (36580-36586) describing the Milestones Plan in §430.24(c). You must require the plan under your authority to use Best Professional Judgement to establish permit conditions. For example, Great American's Milestone Plan must lay out (in much more detail) the following schedule:

Technology	Begin Construction	Complete Construction	Process Fully Operational
install additional brown stock washing stage	March 1999	October 1999	January 2000
install two-stage oxygen delignification system, including post-oxygen washing and mixing and control systems	April 2001	April 2003	June 2003
upgrade white liquor oxidizing equipment to increase capacity	April 2002	April 2003	June 2003
upgrade existing chlorine dioxide generator to expand capacity	June 2002	September 2003	January 2004
add chlorine dioxide storage facilities	January 2003	September 2003	January 2004

In addition, the Milestone Plan must present the anticipated reductions in effluent quantity and improvements in effluent quality as measured at the bleach plant (for bleach plant, pulping area and evaporator condensates flow and BAT parameters other than Adsorbable Organic Halides (AOX)) and at the end of the pipe (for AOX).

Interim Milestones

You musts develop enforceable interim milestones to ensure that Great American Paper makes continuous progress on the improvements to Fiber Line #2. The milestones, based on your professional judgment and information provided in Great American's Milestone Plan, can be expressed as narrative or numeric conditions in the mill's permit.

Stage 2 Permit Limits

By April 15, 2004, you must establish Stage 2 permits limits based on the ultimate limitations for the selected tier for each fiber line. In this case, you must update permit limits for Fiber line #2 so that they include the baseline BAT and ultimate VATIP requirements for Tier I. You should revise the permit to include:

1. Updated conventional pollutant limits based on BPT for the fine paper segment and the paperboard, coarse paper, and tissue segment. Or, if the mill has modified paper manufacturing operations, you must account for new production (for the purpose of this

case study, we assume that Great American Paper continues to manufacture fine paper and paperboard at constant production rates. For an actual permit, you must review production data to make this determination.).

2. Updated mass-based toxic and nonconventional pollutant limits (i.e., AOX and chloroform) for Fiber line #1 based on baseline BAT and VATIP Tier I (for the purpose of this case study, we assume that unbleached kraft pulp production rate has remained constant).

3. Toxic and nonconventional pollutant limits for Fiber line #2 based on baseline BAT and VATIP Tier I.

4. AOX permit limits based on the allowable loads, as limited by Tier I, attributable to both fiber lines.

Step #3 - Toxic and nonconventional pollutant limits for Fiber line #2 based on BAT and ultimate VATIP requirements for Tier I.

For Stage 2 permit limits, you must establish updated permit limits for Fiber line #2 based on baseline BAT for TCDD, TCDF, chloroform, and the 12 chlorinated phenolic compounds and Tier I VATIP requirements for AOX and kappa number (AOX permit limits are discussed in Step #4).

Step #4 - AOX permit limits based on the allowable loads, as limited by Tier I, attributable to both fiber lines.

Since AOX is limited in final effluent, you must simply multiply the total unbleached pulp production rate by the AOX limit. See Table 11-10 below.

Stage 2 permit limits. The table below presents Great American Paper's Stage 2 permit limits. If Great American Paper consistently meets permit limits, you have included a provision that allows for reduced monitoring frequencies for chlorinated pollutants. The permit allows for reduced monitoring one year after consistently meeting baseline BAT and VATIP requirements. The table below presents the mill's Stage 2 permit limits.

Table 11-10: Stage 2 Permit Limits, Great American

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
TCDD	<10 pg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
TCDF	31.9 pg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
TCDF	31.9 pg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
Chloroform	4.7 kg/day	2.8 kg/day	BPE from Fiber line #1	Quarterly	6 grabs/24 hr
Chloroform	3.6 kg/day	2.1 kg/day	BPE from Fiber line #2	Monthly (1 yr) (a)	6 grabs/24 hr
Trichlorosyringol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
3,4,5-Trichlorocatechol	<5.0 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
AOX	712 kg/day	320 kg/day	Final Effluent	Daily (yr 1)	24 hr composite
				Monthly (after yr 1)	
COD	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	14,721 kg/day	7,655 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	28,819 kg/day	16,054 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow	Report	Report	BPE from Fiber line #1	Continuous	Recorder
Flow	Report	Report	BPE from Fiber line #2	Continuous	Recorder
Flow	Report	Report	Final Effluent	Continuous	Recorder
Kappa Number	18 kappa units	--	Fiber Line #1 - pulp exiting OD system prior to bleaching		
Kappa Number	13 kappa units	--	Fiber Line #2 - pulp exiting OD system prior to bleaching		

BPE = Bleach Plant Effluent

Case Study #9

Sunburst Paper is an integrated pulp and paper mill that manufactures fine paper. Sunburst Paper operates a TCF bleached papergrade kraft fiber line and also purchases market pulp for use in their fine paper production. All process wastewaters generated by Sunburst Paper are treated using primary and secondary treatment prior to discharge into the Eva River. The mill has submitted a permit application because their current NPDES permit expires December 2000.

Case Study #9 highlights:

1. Permit process for integrated mills with operations in Subpart B who also purchase pulp.
2. Production rate determination.
3. AOX contributions from purchased pulp where on-site pulp bleaching is TCF.

General Site Description

Sunburst Paper operates a TCF bleached kraft fiber line producing bleached pulp that is used along with purchased pulp to manufacture fine papers. The purchased pulp makes up 50% of the final fine paper product.

Relevant Information for Establishing Permit Limits

The table below summarizes the relevant information from the permit application you need to calculate discharge limits for the reissued NPDES permit.

Information Needed to Establish Permit Limits for Case Study #9	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subparts B
The mill is subject to which ELG&S?	Subpart B BPT (40 CFR 430.22) Pulp and Fine Paper Segment BAT (40 CFR 430.24) [Note: The Subpart K ELG&S do not apply since this is an integrated mill.]
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	Yes (The mill also purchases pulp that is not TCF.)
Does the mill use chlorophenolic biocides?	No

Determining Permit Limits for Pollutants Regulated Under BPT

Sunburst Paper manufactures one product (fine paper) that falls under one subcategory of Subpart B. Because BPT ELGs are mass-based, you must review their permit application to determine production rates for each product to calculate their BPT limits. The table below explains how to calculate the production rate (also see Section 8 for a description of how to calculate production rates).

CASE STUDY # 9

In reviewing the monthly production data for Sunburst Paper from the last five years, you find that the maximum production occurred from November 1997 - October 1998. The monthly production data from this time period will determine the production rate that results in the maximum permit limits for conventional pollutants.

Date	Fine Paper Production (OMMT)
11/97	11,100
12/97	11,300
1/98	12,400
2/98	11,200
3/98	12,500
4/98	11,200
5/98	11,400
6/98	1,600
7/98	11,700
8/98	11,900
9/98	11,800
10/98	11,900
Production Total (OMMT/yr)	**140,000**
Total Op. Days/Year	**350**
Production Total (OMMT/day)	**400**

You may then calculate conventional pollutant permit limits using the following equation:

Final Effluent Limit = PROD × Limit

where:

PROD	=	Production rate (kkg/day)
LIMIT	=	ELG for conventional pollutant (kg/kkg)

The table below presents the calculation of conventional pollutant permit limits calculated for this mill.

			TSS				BOD			
			Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
Subcategory	Segment	Production	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
Subpart B	Fine Paper	400 kkg/day	22.15 kg/kkg	8,860 kg/day	11.9 kg/kkg	4,760 kg/day	10.6 kg/kkg	4,240 kg/day	5.5 kg/kkg	2,200 kg/day

Determining Permit Limits for Pollutants Regulated Under BAT

The TCF bleaching operations at Sunburst Paper are covered under Subpart B. The BAT ELG&S include a maximum daily limitation for AOX at the mill final effluent of <ML and a reserved limitation for COD. Sunburst Paper has certified to TCF bleaching as required by 40 CFR 122.22. However, due to whitewater recycling in the process, the mill has a measurable effluent of AOX due to their use of non-TCF purchased pulp. Therefore, you should work with the facility to develop a no-net AOX mass-based limitation to use in their permit.

To do this, you need to require the facility to monitor the following:

- AOX in the pulp going into the bleach plant;
- AOX in recycled water used in the bleach plant; and
- AOX in the pulp and filtrates from the bleach plant.

The facility will need to monitor flows for these streams so that an AOX mass balance can be developed for the process. The results of the mass balance will determine what “no-net” AOX mass is coming from the purchased pulp (in kg/kkg) this mass should be adjusted with a variability factor and then multiplied by the mass/day use of purchased pulp. You may then calculate an AOX permit limit (which can be applied at the bleach plant or at the mill final effluent) using the following equation:

AOX Allowable Limit = No-Net AOX Limit (kg/kkg) × purchased pulp rate (kkg/day)

The mill purchases 200 ADMT/day of non-TCF pulp. The mill no-net AOX balance shows that 0.2 kg/kkg of AOX results from the use of the purchased pulp. The AOX allowable limit is therefore:

AOX Allowable Limit = 200 kkg/d × 0.2 kg/kkg = 40 kg/d

Final Permit Limits for Sunburst Paper

Table 11-11 presents the permit limits for Sunburst Paper. The table also shows that you exercised BPJ to include the following in the permit:

1. COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and
3. Mandatory flow measurements of bleach plant and final effluent.

Make sure you also include the following in the permit:

- A reopener clause so that you may include COD permit limits when EPA promulgates ELGs for this pollutant (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-11: Permit Limits for Sunburst Paper

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
AOX	40 kg/day	--	Final Effluent	Daily**	24 hr composite
COD*	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	4,240 kg/day	2,200 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	8,860 kg/day	4,760 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	Kraft Mill Fiber Line BPE	Continuous	Recorder
Flow*	Report	Report	Final Effluent	Continuous	Recorder

*Reporting for COD and flow based on BPJ.
**Using BPJ you may want to reduce the AOX sample frequency after sufficient data is provided that shows consistent compliance with the “no-net” AOX limits.